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APPARATUS FOR REMOVABLY MOUNTING ON A DRIVE SHAFT A PART DRIVEN BY THE SHAFT

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FIG. 3

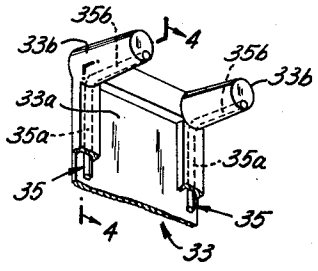


FIG. 4

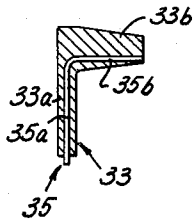


FIG. 5

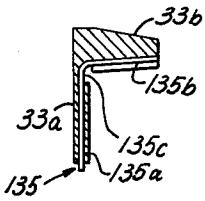
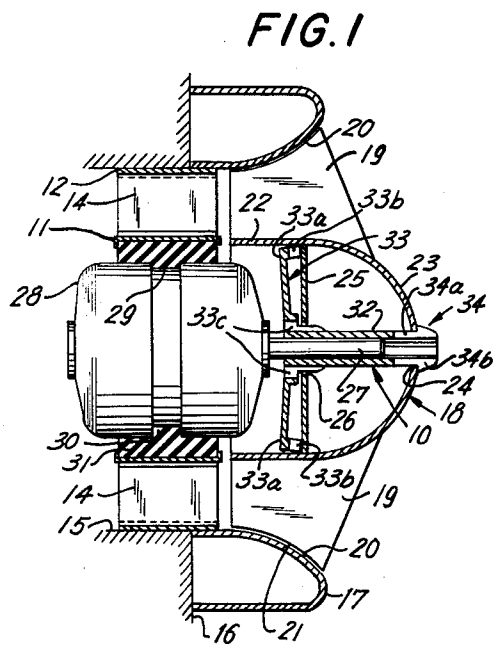


FIG. 1



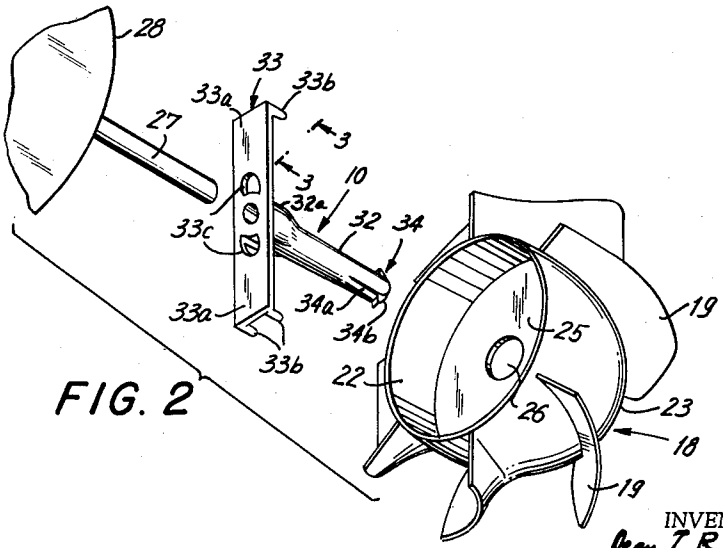


FIG. 2

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APPARATUS FOR REMOVABLY MOUNTING ON A DRIVE SHAFT A PART DRIVEN BY THE SHAFT

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5 Claims. (Cl. 287—53)

Our invention relates to apparatus for removably mounting on a drive shaft a part driven by the shaft.

The object of our invention is to provide an improved apparatus or coupling of simplified construction for removably mounting on a drive shaft a part driven by the shaft.

Further objects and advantages of our invention will become apparent as the following description proceeds, and the features of novelty which characterize the invention will be pointed out with particularity in the claims annexed to and forming a part of this specification.

For a better understanding of our invention, reference may be had to the following description taken in connection with the accompanying drawing, in which:

FIG. 1 is a vertical sectional view of a motor-driven ventilating fan illustrating a coupling embodying the invention;

FIG. 2 is an exploded perspective view of a part of the ventilating fan shown in FIG. 1 to illustrate details;

FIG. 3 is an enlarged fragmentary perspective view taken at line 3—3 of FIG. 2;

FIG. 4 is a fragmentary sectional view taken at line 4—4 of FIG. 3; and

FIG. 5 is a sectional view similar to FIG. 4 illustrating a modification of a detail.

Referring to FIG. 1 of the drawings, the invention is shown in connection with a room ventilating unit having an annular housing formed by an inner cylindrical casing **11** and an outer annular member **12**, the casing **11** being supported within the annular member **12** by spaced radially disposed walls **14**. The outer member **12** is mounted in any suitable manner in an opening or duct **15** of a wall **16**.

The casing **11** and an outwardly flaring hollow tubular part or guide **17**, which is fixed to one side of wall **16** in any suitable manner, defines an air passageway within which is centrally disposed a fan **18** formed with blades **19** whose outer edges **20** have the same configuration in an axial direction as the outwardly flared tubular part or guide **17** and are spaced from the latter by a gap **21**.

The inner edges of the blades **19** are joined to a cylindrical part **22** having a closed front **23** of semi-spherical shape formed with a central opening **24** and a rear closure plate **25** having an opening **26** therein. The fan **18** is fixed to a shaft **27** of an electric motor **28** in a manner which will be described hereinafter.

The motor **28** is carried within the cylindrical casing **11** in any suitable manner. As shown, the motor **28** may be provided with an annular groove **29** which receives an inwardly extending ridge **30** of an annular resilient member **31** which is disposed about the inner casing **11** and snugly fits on the motor **28**.

In accordance with our invention, the fan **18** is removably mounted on the motor shaft **27** by a coupling **10** comprising a hollow member **32** which is fixed to the shaft in any suitable manner and extends through the central openings **24** and **26** of the fan and has an element **33** at its rear end and a latch or catch **34** at its opposite front end for firmly holding the fan **18** therebetween.

The element **33** essentially forms a resilient bridge which is transverse to the axis of the shaft **27** and includes portions **33***a* at diametrically opposite sides of the shaft which are apertured at **33***c* to increase the flexibility of the bridge. The outer ends of the radially disposed bridge portions **33***a* are provided with spaced arms **33***b* which extend toward and bear against the rear closure plate **25** of the fan **18**. The hollow member **32** is formed with a pair of spring fingers **34***a* which normally diverge from one another and are provided with detents **34***b* at their outer ends which function as the latch or catch **34**. The spring fingers **34***a* are movable from the positions illustrated in FIG. 2 to the positions shown in FIG. 1 in which the detents **34***b* overlie the portion of the closed front **23** at the vicinity of the opening **24** therein.

With the hollow member **32** firmly secured to the shaft **27** in any suitable manner, the fan **18** is coupled to the shaft **27** by moving it rearward over the member **32** from the position shown in FIG. 2. The outer surfaces of the detents **34***b* are beveled, as best shown in FIG. 1, to facilitate movement of the spring fingers **34***a* toward one another with rearward movement of the fan **18** when the detents **34***b* contact the rear closure plate **25** at the central opening **26** therein and subsequently contact the curved front **23** at the central opening **24** therein. After the detents **34***b* pass through the opening **24** in the front **23**, they inherently move or snap to their locked or latched position in FIG. 1. To remove the fan **18** from the shaft **27**, the detents **34***b* are manually pressed toward one another against the outward biasing action of the spring fingers **34***a* to permit the detents to clear the opening **24** as the fan **18** is being withdrawn from the coupling **10**. When the detents **34***b* reach the forward face of the rear closure plate **25**, parts of the spring fingers **34***a* will be positioned rearward of the rear closure plate and are accessible so that they can be manually moved toward one another to enable the detents **34***b* to clear the opening **26** in the rear closure plate.

When the fan **18** is fixed to the motor shaft **27** by our improved coupling **10**, the bridge **33**, which is resilient in character, is distorted from its normal shape shown in FIG. 2 and is under tension, whereby the fan **18** will be firmly clamped and anchored in position between the bridge **33** and latch **34** and relative angular movement between the fan **18** and shaft **27** during rotation of the latter will be prevented.

Although the coupling **10** of our invention may be made of metal or any other suitable material and formed of several parts connected together in any suitable manner, we prefer to form the coupling **10** from plastic. By forming the coupling **10** from a single body of material like plastic, for example, the construction is simplified.

When the coupling **10** is formed of plastic, the bridge **33** may be reinforced in any suitable manner, as by sections **35** of stiff resilient wire illustrated in FIGS. 3 and 4. The wires **35** include portions **35***a* and **35***b* bent at right angles to one another, the portions **35***a* being embedded in the outer zones of the bridge portions **33***a* and the portions **35***b* being embedded in the arms **33***b* and extending to the outer extremities of the arms. The portions **35***b* of the wires are exposed at the outer flat surfaces at the extremities of the arms **33***b* so that direct contact between the wire portions **35***b* and the rear closure plate **25** can always be effected when the fan **18** is connected to the coupling **10** irrespective of the extent that the resilient bridge **33** is flexed from its normal position seen in FIG. 2. With such construction, the resilient bridge **33** firmly grips the rear closure plate **25** of the fan **18** to hold the latter rigidly on the motor shaft **27** and prevent relative angular movement therebetween during rotation of the shaft. This is especially true when the fan **18** is formed of a non-metallic material having surfaces which are at least slightly resilient in character.

FIG. 5 illustrates a modification of our coupling in which wires **135** similar to the wires **35** previously de-

scribed are provided on the bridge **33**. In FIG. 5 the wire sections **135***a* are embedded in the outer zones of the bridge portions **33***a* and the wire sections **135***b* are embedded in the arms **33***b* while the bent regions **135***c* therebetween are exposed and snugly fit against outer surfaces of the bridge. In other respects, the modification shown in FIG. 5 and just described is similar to and functions like the embodiment shown in FIGS. 3 and 4 and previously described.

It will be observed that the hollow member **32** of our coupling **10** is provided with an enlarged end section **32***a* to which the resilient bridge **33** is connected. The enlarged end section **32***a* fits snugly in the opening **26** in the rear closure plate **25** of the fan **18** when the latter is coupled to the motor shaft **27**. If desired, the enlarged end section **32***a* of the hollow member **32** and opening **26** in plate **25** may be of such size that the spring fingers **34***a* and detents **34***b*, even though they are in their outermost positions shown in FIG. 2 after clearing the opening **24** in the front **23**, can freely pass through the opening **26** in the plate **25** when the fan **18** is being withdrawn from the coupling **10**. Also, the closed front **23** of the fan and one of the detents **34***b* may be formed with a cooperating lug and notch whereby the fan **18** can be positively locked in position and relative angular movement of the fan and motor shaft **27** will be prevented when the fan is being driven by the motor shaft. In view of the foregoing, it will now be understood that the bridge **33** comprises resilient structure which is fixed to and axially immovable on a first end portion **32***a* of the elongated hollow member **32** which projects axially rearward from the apertured rear closure plate **25** of the fan **18**. The resilient structure formed by the bridge **33** is disposed transverse to the axis of the hollow member **32** and extends radially outward from the first end portion **32***a* of the member **32** and is provided with regions **33***b* which are radially spaced from and distributed about the peripheral surface of the hollow member **32**.

The detents **34***b* at the ends of the spring fingers **34***a* define radially movable catches at a second end portion of the hollow member **32** which projects axially forward through an opening **24** in the closed front **23** of the fan. The catches formed by the detents **34***b* are biased radially outward to a first operative position shown in FIG. 1 in which the catches engage the closed front **23** of the fan **18** about the opening **24** therein. The catches **34***b* are radially movable inward against the bias from the operative position shown in FIG. 1 to a second inoperative position in which the apertured closed front **23** is axially movable past the catches or detents **34***b*.

The radially spaced regions **33***b* of the structure **33** have movement imparted thereto from first unflexed positions shown in FIG. 2 to second flexed positions shown in FIG. 1, such movement of the radially removed regions **33***b* in a first rearward axially extending direction from the catches or detents **34***b* being responsive to mounting of the apertured fan **18** on the hollow member **32**. In their second flexed positions shown in FIG. 1, the radially spaced regions **33***b* of the structure **33** are resiliently biased in a second opposite axially extending direction toward the catches or detents **34***b* to clamp the apertured fan **18** between the structure **33** and the catches **34***b*.

Although particular embodiments of the invention have been shown and described, it will be apparent to those skilled in the art that modifications may be made without departing from the spirit and scope of the invention, as pointed out in the following claims.

We claim:

1. In apparatus of the class described, a driving shaft, an apertured part driven by the shaft, means for removably mounting the part on the shaft comprising a member which is fixed to the shaft and rotatable therewith, the member extending through the aperture in the part, the

mounting means including an element at one end of the member and a latch at the opposite end of the member for holding the part therebetween, the latch comprising one or more resilient hooks, the element being resilient in character and including portions at diametrically opposite sides of the shaft, and the portions of the element having projections bearing against the part in directions essentially parallel to the axis of the shaft.

2. Apparatus as set forth in claim 1 in which the element is reinforced by lengths of essentially stiff resilient metal wire having first sections transverse to the axis of the shaft and second sections bent at an angle to the first sections and extending substantially to the outer ends of the projections in directions essentially parallel to the axis of the shaft.

3. In apparatus of the class described, a driving shaft, an apertured part driven by the shaft, means for removably mounting the part on the shaft comprising a member which is fixed to the shaft and rotatable therewith, the member extending through the aperture in the part, the mounting means including an element at one end of the member and a latch at the opposite end of the member for holding the part therebetween, and the element comprising a resilient bridge transverse to the axis of the shaft and reinforced by one or more lengths of essentially stiff resilient metal wire having sections extending toward the part in an axially extending direction of the shaft.

4. In apparatus of the class described, a driving shaft, an apertured part driven by the shaft, means for removably mounting the part on the shaft comprising a member which is mounted on the shaft and fixed thereto, the member extending through the aperture in the part and having first and second axially extending end portions, resilient structure fixed to the first end portion of the member and axially immovable thereon, the structure being disposed transverse to the axis of the member and extending radially outward from the first end portion of the member and having radially spaced arms extending axially toward the second end portion of the member and distributed about the peripheral surface of the member, the member having at least one radially movable catch at the second end portion thereof which is biased radially outward to a first operative position in which the catch engages the apertured part at one end thereof and is radially movable inward therefrom against the bias to a second inoperative position in which the apertured part is axially movable past the catch, and the radially spaced arms of the structure having movement imparted thereto from a first position to a second position in a first axially extending direction from the catch responsive to mounting of the apertured part on the member and in the second position being resiliently biased in a second opposite axially extending direction toward the catch to clamp the apertured part between the structure and the catch.

5. Apparatus as set forth in claim 4 in which the member is formed with an axially extending passage within at least the second end portion thereof, the second end portion of the member being axially displaced from the driving shaft and forming a hollow sleeve, the sleeve being split axially to provide at least one resilient finger, the radially movable catch comprising means including the one resilient finger, and the member and the catch and the resilient structure being formed by a single body of plastic material.

References Cited in the file of this patent

UNITED STATES PATENTS

892,021	Wirsching	June 30, 1908
1,319,429	Spiro	Oct. 21, 1919
2,536,149	Anest	Jan. 2, 1951
2,622,818	Faris et al.	Dec. 23, 1952
2,940,781	Erickson	June 14, 1960